Malnutrition in geriatric rehabilitation: prevalence, patient outcomes and criterion validity of the Scored Patient-Generated Subjective Global Assessment (PG-SGA) and the Mini Nutritional Assessment (MNA)

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Malnutrition in geriatric rehabilitation

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Skye Marshall

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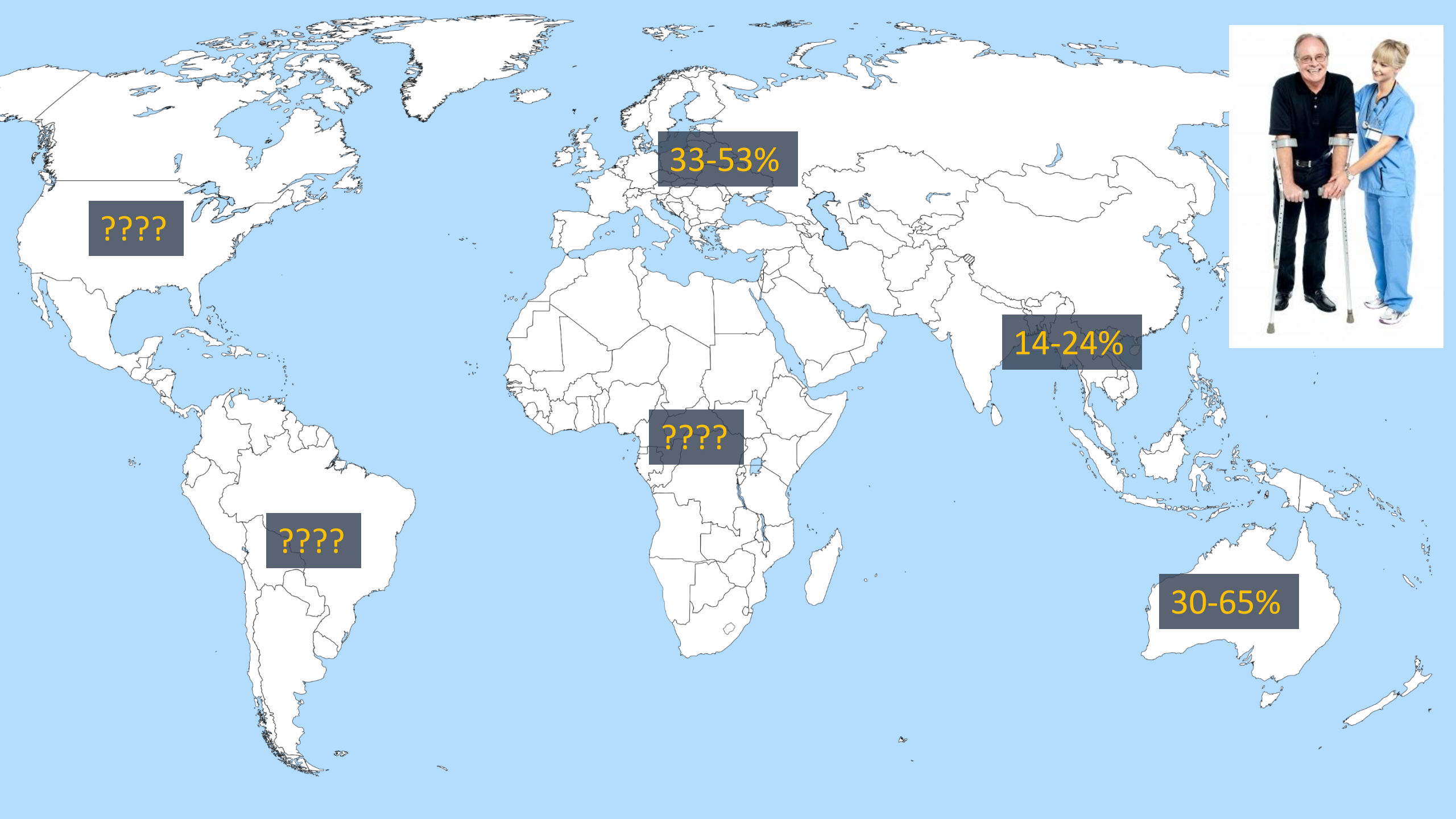
BOND UNIVERSITY

What is malnutrition?

"Food and nutrient intake is unable to meet protein, energy and nutrient requirements over time leading to a disruption of homeostasis in lean tissues, body weight and physical function."

Skipper A. Agreement on defining malnutrition. *Journal of Parenteral and Enteral Nutrition*. 2012;36(3):26

Kunert MP. Stress and Adaptation. In: Porth CM, editor. Pathophysiology, concepts of altered health states. 7th e.d. Philadelphia: Lippincott Williams & Wilkins; 2005. p. 187 - 276.


33-53%
????
14-24%
????
????
30-65%

The MARRC Study: Malnutrition in the Rural Rehabilitation Community (Observational cohort: Aug 2013-Feb 2014)

In malnourished older adults admitted to rehabilitation:

1) Determine the criterion (concurrent and predictive) validity of nutrition assessment tools:
   - Scored Patient-Generated Subjective Global Assessment (PG-SGA)
   - Mini Nutritional Assessment (MNA) in diagnosing malnutrition;

1) Report the prevalence, health and aged care use, and mortality of rural malnourished older adults.

Methods

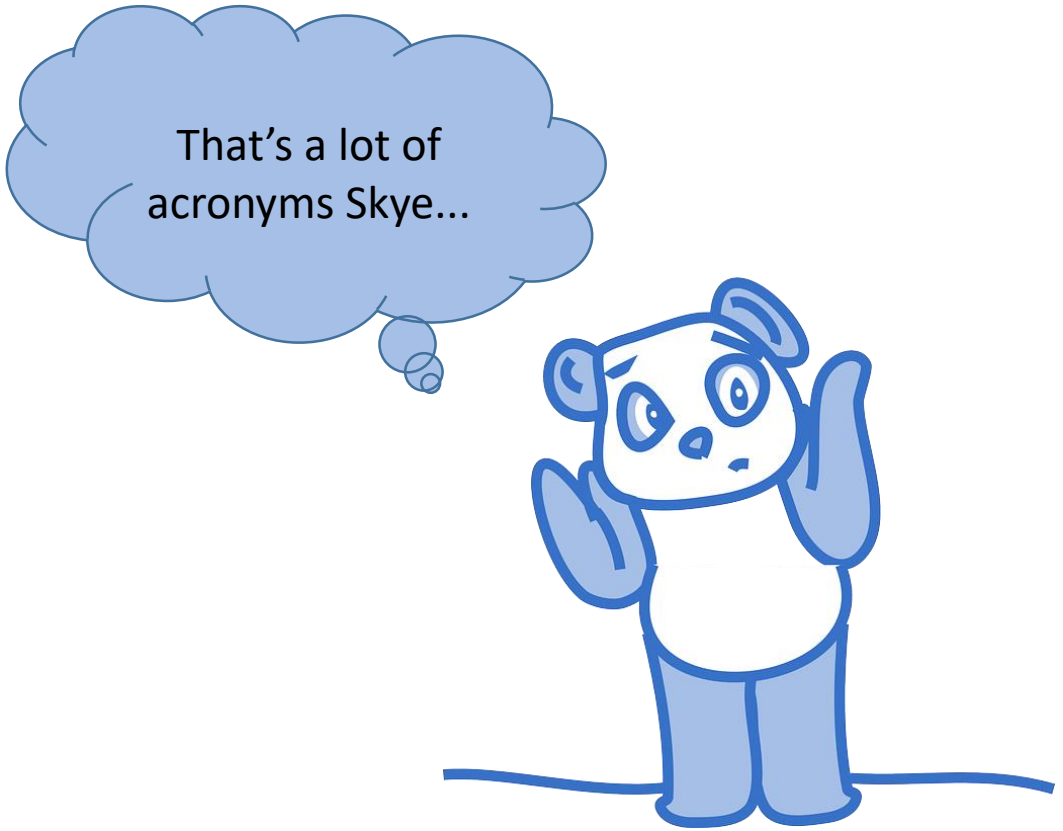
Participants:

- Rehabilitation inpatients in rural NSW
- n=57, 79 years, 49% female
- Live at home usually
- Usual care (0.15FTE dietitian)

Methods of diagnosis at admission	1. ICD-10-AM Classification of malnutrition (yardstick) 2. Scored Patient-Generated Subjective Global Assessment (PG-SGA) 3. Mini Nutritional Assessment (MNA)
Longitudinal outcomes at discharge	1. Discharge location (home/hospital/other) 2. Length of rehabilitation stay
Longitudinal outcomes at 12 weeks post-discharge	1. Admission to residential aged care at 12 weeks post-discharge 2. Mortality at 12 weeks post-discharge 3. Rehospitalisation length of stay at 12 weeks post-discharge

Methods

Methods of diagnosis at admission	1. ICD-10-AM Classification of malnutrition (yardstick) 2. Scored Patient-Generated Subjective Global Assessment (PG-SGA) 3. Mini Nutritional Assessment (MNA)



Methods

Criterion validity:

1) Concurrent validity: compared to accepted standard
   - ICD-10-AM (hospital coding for malnutrition)
   - Sensitivity and specificity (%)

2) Predictive validity
   - Health and aged care outcomes
   - Significant difference (t-test or chi-squared)

The International Statistical Classification of Diseases and Health Related Problems 10th Revision Australian Modification (sixth edition, **ICD-10-AM**) classifications for protein-energy malnutrition in adults

Classification	Definition
E43: Unspecified severe protein-energy malnutrition	In adults, BMI[a] <18.5 kg[b]/m[c2] or unintentional loss of weight (≥10%) with evidence of suboptimal intake resulting in severe loss of subcutaneous fat and/or severe muscle wasting
E44.0: Moderate protein-energy malnutrition	In adults, BMI <18.5 kg/m^2 or unintentional loss of weight (5-9%) with evidence of suboptimal intake resulting in moderate loss of subcutaneous fat and/or moderate muscle wasting
E44.1: Mild protein-energy malnutrition	In adults, BMI <18.5 kg/m^2 or unintentional loss of weight (5-9%) with evidence of suboptimal intake resulting in mild loss of subcutaneous fat and/or mild muscle wasting

Global rating (A, B, C) criterion validity in geriatric rehabilitation patients?

- Sensitivity 100%
- Specificity 87%
- Can predict
  - rehospitalisation LOS (*P*=0.005)
  - admission to RACF (*P=0.008)*
  - discharge location (*P*=0.046)

= ***STRONG CRITERION VALIDITY***

Score (≥7) criterion validity in geriatric rehabilitation patients?

- Sensitivity 92%
- Specificity 84%
- ROC AUC 0.910±0.038
- Can predict
  - rehospitalisation LOS (*P*=0.03)
  - discharge location (*P*=0.033)

= ***STRONG CRITERION VALIDITY***

The Scored PG-SGA

- Global rating:
  - A = Well-nourished
  - B = Moderately malnourished
  - C = Severely malnourished
- Score: ≥9 in adult oncology patients

We recommend for use in geriatric rehabilitation

The MNA

Nestlé Nutrition Institute

Mini Nutritional Assessment
MNA®

Last name: First name:

Sex: Age: Weight, kg: Height, cm: Date:

Complete the screen by filling in the boxes with the appropriate numbers. Add the numbers for the screen. If score is 11 or less, continue with the assessment to gain a Malnutrition Indicator Score.

Screening

A Has food intake declined over the past 3 months due to loss of appetite, digestive problems, chewing or swallowing difficulties?
0 = severe decrease in food intake
1 = moderate decrease in food intake
2 = no decrease in food intake

B Weight loss during the last 3 months
0 = weight loss greater than 3kg (6.6lbs)
1 = does not know
2 = weight loss between 1 and 3kg (2.2 and 6.6 lbs)
3 = no weight loss

C Mobility
0 = bed or chair bound
1 = able to get out of bed / chair but does not go out
2 = goes out

D Has suffered psychological stress or acute disease in the past 3 months?
0 = yes 2 = no

E Neuropsychological problems
0 = severe dementia or depression
1 = mild dementia
2 = no psychological problems

F Body Mass Index (BMI) (weight in kg) / (height in m²)
0 = BMI less than 19
1 = BMI 19 to less than 21
2 = BMI 21 to less than 23
3 = BMI 23 or greater

Screening score
(subtotal max. 14 points)

12-14 points: Normal nutritional status
8-11 points: At risk of malnutrition
0-7 points: Malnourished

For a more in-depth assessment, continue with questions G-R

Assessment

G Lives independently (not in nursing home or hospital)
1 = yes 0 = no

H Takes more than 3 prescription drugs per day
0 = yes 1 = no

I Pressure sores or skin ulcers
0 = yes 1 = no

J How many full meals does the patient eat daily?
0 = 1 meal
1 = 2 meals
2 = 3 meals

K Selected consumption markers for protein intake
- At least one serving of dairy products (milk, cheese, yoghurt) per day yes no
- Two or more servings of legumes or eggs per week yes no
- Meat, fish or poultry every day yes no

0.0 = if 0 or 1 yes
0.5 = if 2 yes
1.0 = if 3 yes

L Consumes two or more servings of fruit or vegetables per day?
0 = no 1 = yes

M How much fluid (water, juice, coffee, tea, milk...) is consumed per day?
0.0 = less than 3 cups
0.5 = 3 to 5 cups
1.0 = more than 5 cups

N Mode of feeding
0 = unable to eat without assistance
1 = self-fed with some difficulty
2 = self-fed without any problem

O Self view of nutritional status
0 = views self as being malnourished
1 = is uncertain of nutritional state
2 = views self as having no nutritional problem

P In comparison with other people of the same age, how does the patient consider his / her health status?
0.0 = not as good
0.5 = does not know
1.0 = as good
2.0 = better

Q Mid-arm circumference (MAC) in cm
0.0 = MAC less than 21
0.5 = MAC 21 to 22
1.0 = MAC 22 or greater

R Calf circumference (CC) in cm
0 = CC less than 31
1 = CC 31 or greater

Assessment (max. 16 points)

Screening score

Total Assess

Malnutrition Indicator Score

24 to 30 points normal nutritional status

17 to 23.5 points at risk of malnutrition

less than 17 points malnourished

Ref. Vellas B, Villars H, Abellan G, et al. *Overview of MNA® - Its History and Challenges*. J Nut Health Aging 2006; 10: 456-465.
Rubenstein LZ, Harker JO, Salva A, Guigoz Y, Vellas B. Screening for Undernutrition in Geriatric Practice: *Developing the Short-Form Mini Nutritional Assessment (MNA-SF)*. J. Geront 2001; 56A: M366-377.
Guigoz Y. The Mini-Nutritional Assessment (MNA®) *Review of the Literature – What does it tell us?* J Nut Health Aging 2006; 10: 466-487.

For more information: www.mna-elderly.com

Categories' criterion validity in geriatric rehabilitation patients?

- Sensitivity 58%
- Specificity 97%
- Can predict
  - rehospitalisation (*P*=0.023)
  - admission to RACF (*P*=0.034)
  - discharge location (*P*=0.019)

= ***MODERATE CRITERION VALIDITY***

We recommend to use with caution in geriatric rehabilitation

Prevalence and health outcomes

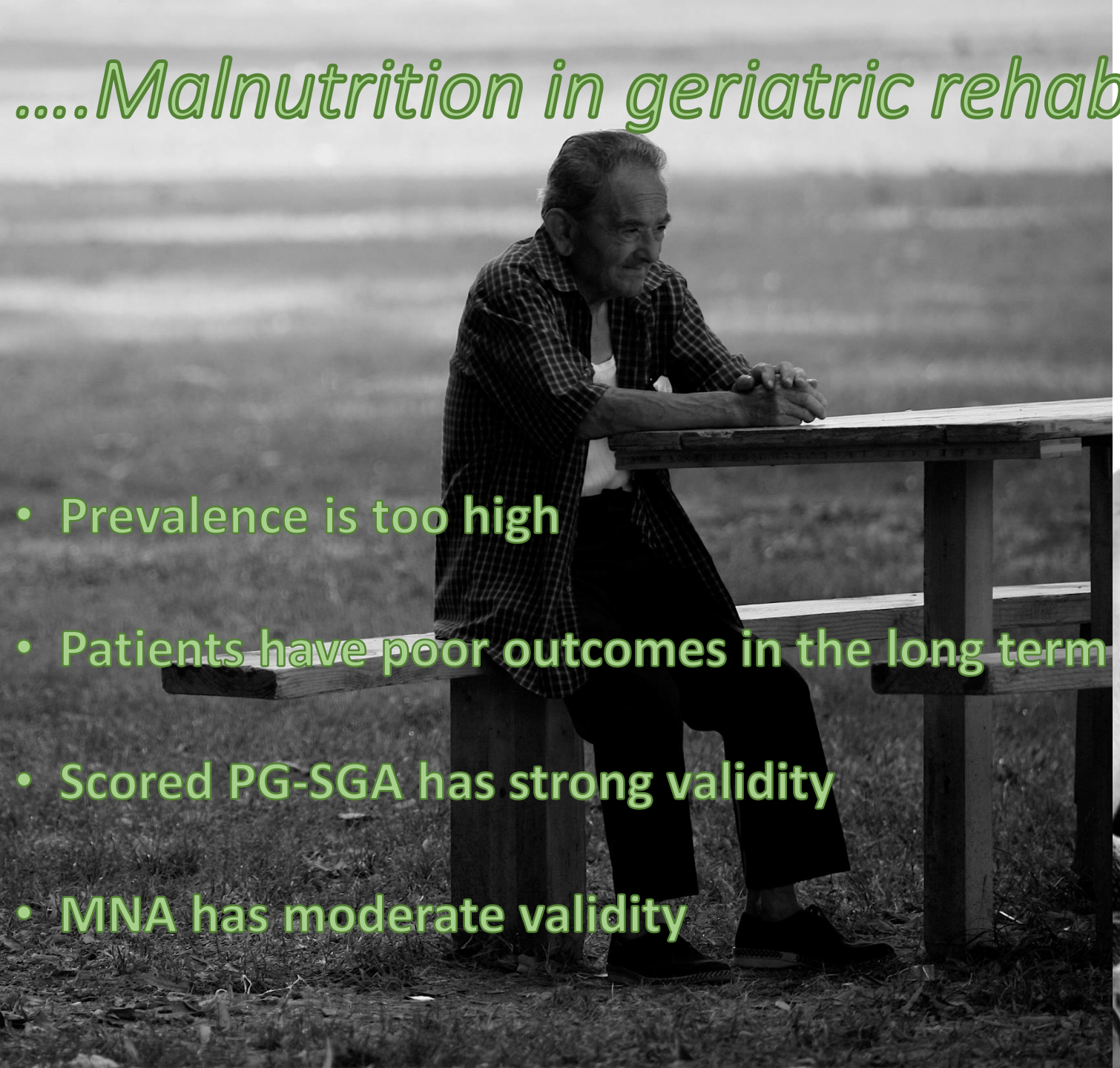
Malnutrition prevalence was 46% (ICD-10-AM)

Variable	Well-nourished (n=31)	Malnourished (n=26)	P-value
Rehabilitation LOS[a] (days), median (IQR[b])	23.0 (16.0-37.5)	22.0 (13.75-32.75)	NS
Rehospitalization LOS (days), median (IQR)[c]	4.0 (1.0-14.75)	10.0 (7.0-36.0)	0.032
Rehospitalization incidence - Median (IQR)[c] - Counts (%)	2.0 (1.0-2.0) n=12 (38.7%)	1.0 (1.0-2.0) n=11 (38.5%)	NS
Discharge location, counts (%) - Home - Other[e]	n=27 (87.1%) n=4 (12.9%)	n=17 (65.4%) n=9 (34.6%)	0.052
Admitted to RACF[g], counts (%)	n=4 (12.9%)	n=7 (26.9%)	NS
Mortality, counts (%)	n=0	n=3 (11.5%)	0.052

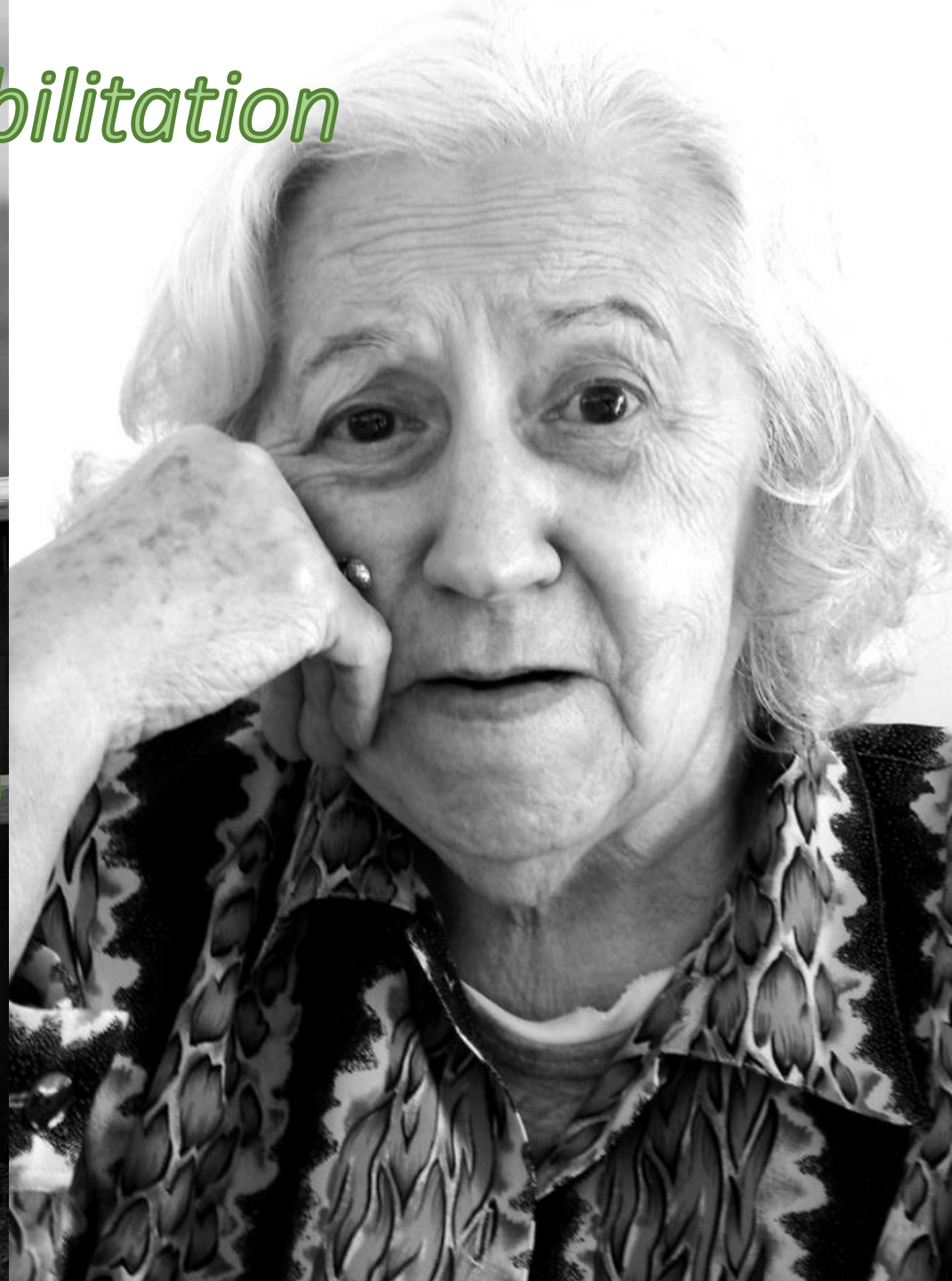
Limitations

- Generalisability
- Limitation in yardstick
- Smallish sample size
- Researcher bias

….Malnutrition in geriatric rehabilitation



- Prevalence is too high
- Patients have poor outcomes in the long term
- Scored PG-SGA has strong validity
- MNA has moderate validity



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Malnutrition in geriatric rehabilitation:

Prevalence, patient outcomes and criterion validity of the Scored Patient-Generated Subjective Global Assessment (PG-SGA) and the Mini Nutritional Assessment (MNA)

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Introduction

There is strong evidence showing malnutrition is under-recognized and underdiagnosed in the rehabilitation setting. Accurate identification and management of malnutrition is essential so that patient outcomes may be improved and resources used efficaciously.

The Scored PG-SGA and MNA require evaluation of their validity in diagnosing malnutrition in rehabilitation. In addition, the prevalence of malnutrition and associated patient outcomes in rural Australian populations has not been reported.

Purpose

In malnourished older adults admitted to rural rehabilitation units, the purpose of this study was to:

1) report the prevalence of malnutrition, health and aged care use, and mortality

2) determine and compare the criterion (concurrent and predictive) validity of the Scored PG-SGA and the MNA in diagnosing malnutrition

Methods

Participants were English-speaking inpatients ≥65 years admitted to two public rehabilitation units in the same local health district in rural NSW, if they were community-dwelling residents prior to admission and they had an informal caregiver. Observational data were collected prospectively from August 2013 to February 2014.

Nutrition assessment using the Scored PG-SGA and MNA was conducted by one trained researcher (Accredited Practising Dietitian) in both facilities within seven days of admission. The Scored PG-SGA (ratings B & C indicating 'malnutrition') and MNA (score <17 indicating 'malnutrition') were compared as binary variables with the ICD-10-AM classification of malnutrition using measures of diagnostic accuracy to establish concurrent validity. The ICD-10-AM criteria was used to report malnutrition prevalence. Length of stay (LOS), discharge location, rehospitalisation, admission to a residential aged care facility (RACF) and mortality were measured at 12 weeks post-discharge to report health-related outcomes and to evaluate predictive validity.

Results




- Fifty-seven older adults (μ79.1±7.3years) were recruited
- **Malnutrition prevalence was 46%**
- Median LOS was 23 (IQR 16-37.5) days. 3 malnourished patients died and no well-nourished patients died
- **Malnourished patients were more likely to be admitted to an RACF and readmitted to hospital with a longer LOS**
- Malnourished patients were less likely to be discharged to their own home

Table 1: Measures of diagnostic accuracy of the Scored PG-SGA and MNA

	Kappa statistic	Sensitivity	Specificity	ROC AUC*
PG-SGA	0.860**	100%	87%	0.910
MNA	0.562**	58%	97%	0.854

* ROC AUC: Receiver Operating Characteristics Area Under the Curve
** P <0.0001

- When compared to the ICD-10-AM criteria, **the Scored PG-SGA showed stronger diagnostic accuracy than the MNA**, where the MNA was found to under-diagnose malnutrition (table 1)
- **The Scored PG-SGA and the MNA showed strong predictive validity** for rehospitalisation, admission to an RACF and discharge location

Conclusions

Malnutrition prevalence in the rural geriatric rehabilitation population is high and associated with increased health and aged care use.

The Scored PG-SGA is suitable for nutrition assessment in geriatric rehabilitation. The MNA may be suitable for nutrition assessment in geriatric rehabilitation, but care should be taken to ensure all malnourished patients are identified.

Marshall S, Young A, Bauer J, Isenring E. Malnutrition in geriatric rehabilitation: prevalence, patient outcomes and criterion validity of the Scored Patient-Generated Subjective Global Assessment (PG-SGA) and the Mini Nutritional Assessment (MNA) Journal of the Academy of Nutrition and Dietetics. 2015;In Press.

eat right.

RESEARCH
Original Research

Malnutrition in Geriatric Rehabilitation: Prevalence, Patient Outcomes, and Criterion Validity of the Scored Patient-Generated Subjective Global Assessment and the Mini Nutritional Assessment

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*APD—Accredited Practising Dietitian (certified in Australia).

ABSTRACT

Background Accurate identification and management of malnutrition is essential so that patient outcomes can be improved and resources used efficaciously.

Objectives In malnourished older adults admitted to rehabilitation: 1) report the prevalence, health and aged care use, and mortality of malnourished older adults; 2) determine and compare the criterion (concurrent and predictive) validity of the Scored Patient-Generated Subjective Global Assessment (PG-SGA) and the Mini Nutritional Assessment (MNA) in diagnosing malnutrition; and 3) identify the Scored PG-SGA score cut-off value associated with malnutrition.

Design Observational, prospective cohort.

Participants/setting Participants were 57 older adults (65 years and older; mean ±standard deviation age=79.1±7.3 years) from two rural rehabilitation units in New South Wales, Australia.

Measurements/statistical analysis Scored PG-SGA; MNA; and the *International Statistical Classification of Diseases and Health Related Problems, 10th revision, Australian Modification* (ICD-10-AM) classification of malnutrition were compared to establish concurrent validity and report malnutrition prevalence. Length of stay, discharge location, rehospitalization, admission to a residential aged care facility, and mortality were measured to report health-related outcomes and to establish predictive validity.

Results Malnutrition prevalence varied according to assessment tool (ICD-10-AM: 46%; Scored PG-SGA: 53%; MNA: 28%). Using the ICD-10-AM as the reference standard, the Scored PG-SGA ratings (sensitivity 100%, specificity 87%) and score (sensitivity 92%, specificity 84%, ROC AUC [receiver operating characteristics area under the curve]=0.910±0.038) showed strong concurrent validity, and the MNA had moderate concurrent validity (sensitivity 58%, specificity 97%, receiver operating characteristics area under the curve=0.854±0.052). The Scored PG-SGA rating, Scored PG-SGA score, and MNA showed good predictive validity. Malnutrition can increase the risk of longer rehospitalization length of stay, admission to a residential aged care facility, and discharge to hospital or residential aged care facility instead of home.

Conclusions Malnutrition prevalence in the geriatric rural rehabilitation population is high, and is associated with increased health and aged care use. The Scored PG-SGA ratings and score are suitable for nutrition assessment in geriatric rehabilitation. The MNA may be suitable for nutrition assessment in geriatric rehabilitation, but care should be taken to ensure all malnourished patients are identified. Additional examination of the criterion validity of the Scored PG-SGA and MNA will lend confidence to these findings.
J Acad Nutr Diet. 2015;■:■-■.

THE PHYSIOLOGICAL AND PSYCHOSOCIAL CONSEQUENCES of malnutrition are significant and diverse. In health care facilities, malnutrition increases morbidity, mortality, and incidence of complications. Overall, this leads to increased treatment costs and length of stay.[1,2] Common symptoms of malnutrition, such as confusion, fatigue, and weakness, are often attributed to other conditions, leading to frequent misdiagnosis and under-recognition of malnutrition.[3] There is strong evidence showing malnutrition is under-recognized and underdiagnosed in the rehabilitation setting, despite a high prevalence (30% to 50%).[4] In addition, the prevalence of